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UNITED STATES DEPARTMENT OF AGRICULTURE

FOREST SERVICE

BRANCH OF RESEARCH

MONTHLY REPORT

OF

FOREST EXPERIMENT STATIONS
FOREST PRODUCTS
FOREST ECONOMICS
RANGE RESEARCH

DEC 1930

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BRANCH OF RESEARCH

December, 1930.

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APPALACHIAN FOREST EXPERIMENT STATION

General

During the last week in December the Station, the Pisgah National Forest, the State District Forester, together with other government offices in the Asheville City Hall, moved to the new Federal Building. This is the fourth set of offices the Station has occupied within the nine and one-half years of its existence. The new quarters provide thirteen rooms for the Station and its cooperators, in place of the seven formerly occupied in the City Hall.

On December 15, Frothingham, with Supervisor Mattoon of the Pisgah National Forest, started an examination of a 4,000 acre tract of virgin spruce on the east slope of the Black Mountain Range, with the purpose of preparing recommendations as to whether the area should be set aside or opened to timber sales. A complete examination was prevented by snow and bad weather, but a trip over one watershed indicated that at least a part of the area should be retained intact. The spruce and fir stand is of rare beauty and its position and relative accessibility to motor highways give it outstanding value as a natural area.

Forest Management Studies in North Georgia.

Field work in north Georgia was suspended in December. Abell completed a study of condition classes on cut-over and woodlot areas near Blairsville, Ga., and took photographs on the permanent sample plots established on the forest tract of the Georgia Mountain Experiment Station. These plots consisted of a pole thinning, a fuelwood improvement cutting, and two clear-cutting areas. Abell and Stone also completed the required work on the plots in removing the cordwood from the clear-cut areas. This work was handled by local labor at $1.25 per day. The contract price for cutting cordwood is $1 per cord. As the local price for cordwood is $1 to $1.50 piled on accessible roads, cost estimates indicate that fuelwood improvement cuttings can be made on accessible areas without cost to the owner. The survey indicates that such improvement cuttings should be made on much of the woodlot area of north Georgia.

Field work in north Georgia will be resumed in the spring. A preliminary report is now being prepared to be based on field notes taken during the fall. Increment borings have been made of some 1800 trees on sixty-two sample plots in representative forest types and condition classes. In addition to survey notes taken by the Station, the report will include compilations of timber cruises on 33,000 acres of private land and acquisition and timber sales on national forest land.

(Over)

Work on the Bent Creek Experimental Forest

On December 22 cutting was begun on unit G-2 of the Bent Creek Experimental Forest. This unit covers about eleven acres on a northwest facing slope in the white oak type. The stand was two storied, with many overmature defective trees in the overstory. The understory was made up largely of inferior species.

The stand was cruised last summer and marked for a "silvicultural improvement" cutting. Two sample plots were laid out. All trees undesirable because of species or condition were indicated for removal. Sixty-one per cent of the cubic volume of the original stand was thus marked.

During the fall several unsuccessful attempts were made to sell the wood on the unit, and it looked as though it would be necessary to hire the cutting done. The situation was relieved through the agency of a recently formed Employment Council of Asheville and Buncombe County, which has started a community woodyard as a means of giving work to unemployed men. Cutting is now actively under way. A free use permit for 200 cords of fuel wood was issued and an average of eight cords of wood per day is being hauled to town from the forest. About fifty men are working in the woods and in the yard where all the wood is sawed. The rate of production is to be increased since more orders for wood are being received than can be filled.

The men are not paid in cash, but receive from the Employment Council a week's provisions in return for three days' labor. The wood is brought to Asheville in eight foot lengths and sawed, by hand, to lengths as ordered. It is sold for $5.00 a cord, the proceeds returning to the Council for the purchase of provisions.

Fire Damage Studies.

Subsequent to the 1930 leaf fall, which was practically complete by December 1, the litter was removed from one plot at Bent Creek. This plot, one-half acre in size, was established in the fall of 1929 and the first removal of litter was done in the spring of 1930. Before the first raking the accumulated litter on the plot amounted to 5500 pounds dry weight. The removal of this litter required 21 man days.

The leaf fall during the past year was 1300 pounds, and only nine man days were required to remove it.

Although the rainfall for the summer of 1930 was far below normal, considerable erosion occurred on the raked plot. This is evidenced by the exposed roots and the beginning of an erosion pavement of pebbles and small stones. One or two small gullies have also begun to form. Erosion is being materially hastened during the winter by frost heaving action which occurred under the light litter and is more pronounced following the raking.

Determinations of the 1930 litter deposition were made on the raking plot and on an adjacent plot burned experimentally in April, 1930. Both plots are in the pine-oak type at an elevation of 2,150 feet, on moderate slopes of southerly aspect. The stand, having a crown density of 0.7, is made up of shortleaf pine, white oak, scarlet oak, black oak, red oak, and post oak, with some hickory, black gum, sourwood, and dogwood. The fresh weight per acre of the litter was determined by weighing the total litter on six milacres on each plot. From each of the six milacres two 30-gram samples were taken for moisture content observations. The 1930 litter deposition on the raked plot amounted to 2,600 pounds per acre, oven-dry weight, while on the burned plot the average of the six samples showed 3,100 pounds per acre, dry weight. According to previous similar determinations made on check plots 7,100 pounds of accumulated litter per acre, dry weight, are normally present on this area. Thus between two and three years' litter is normally present in this type at all times. In other words, between two and three years are required for the decomposition of the litter.

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CALIFORNIA FOREST EXPERIMENT STATION

General

The month opened with a hurry call on the Station for facts in respect to white fir. This was for a conference with the pine lumber group, who had asked a conference for a concerted attack on the Forest Service timber sale requirements in respect to acceptance and utilization of white fir. A special report was rushed through, presenting especially some pertinent results from the Pickering woods and mill study.

One point for which the lumbermen are aiming is to force abandonment of the requirement of felling and taking out white fir from the woods. They want to leave it standing if possible or, failing in this, to cut and leave it in the woods; and to increase the minimum top diameter, if they have to cut, from 12 inches to 16 inches. They present imposing statistics of their losses on white fir, but the Forest Service, knowing that they have only blanket logging and milling costs, all species together, doesn't believe that they know how much they are losing on white fir and is sure that their figures exaggerate it, because they are taking less pains and incurring less cost on this Pariah species than they do on their Brahmin pine.

Out of the meeting came the Joint White Fir Committee, and the lumbermen were so impressed with what was presented that they have contributed money enough to hire the University 80-column Hollerith machine, as well as additional hand computers, to make more complete data available by their next meeting in February. Even with this extra help, all other work on the woods and mill study will have to give way to this special report.

The high spot of the month, from a forestry point of view, was the annual meeting of the California Section, Society of American Foresters, just preceding Christmas. The day's session was devoted primarily to the advancement of State forestry here and brought forth a most gratifying array of excellent papers.

A number of the Staff and other forestry men also attended and participated in the midwinter meeting of the Pacific Division, A.A.A.S., held at Palo Alto on December 23. The Ecological section of the meeting was practically a forestry session, with the members of this Station presenting four of the eight papers.

The assignment of H. L. Person to the Station Staff became effective on December 1 and the redwood work this month makes its bow among Station activities.

Management

Remeasurement data from the Mc plots occupied most of the time of the Management section during December. Some further stand summaries for the Stanislaus woods and mill study were also begun.

Reinecke is finishing up his analysis of the influence of composition on yield in mixed stands of second growth. His next job will be an analysis of nearly 2000 natural reproduction quadrats to determine how many of these it will be necessary to maintain in the future. It is impossible before cutting to determine how each quadrat will be treated, so we have established many more than we intend to carry permanently.

Cover Types

December has been chiefly a month of preparations and final arrangements for the busy field season which for the cover type project is not the summer months but the period from January to April inclusive. It is at this time of the year that field work is done in Southern California, and the regular field crews are augmented by recruits from the Forest Service administrative organization and the State Forester's personnel. During the three past winters, mapping was conducted in the Angeles, San Bernardino, and Santa Barbara National Forests in the order named. This winter the scene of operations will be the Cleveland National Forest and contiguous areas in San Diego, Riverside, and Orange Counties. Work will begin January 5 and there will be five 2-man crews as follows:

Crew #1

Raymond St. John - Calif. Forest Experiment Station.
Charles Van Fleet - State Ranger, Riverside County.

Crew #2
Herbert A. Jensen - Calif. Forest Experiment Station.
William Holland - State Ranger, San Diego County.

Crew #3
F. H. Raymond - California Forest Experiment Station.
H. P. Struble - Stanislaus National Forest.

Crew #4
John Spring - California Forest Experiment Station.
H. E. Norton - Junior Forester, Plumas National Forest.

Crew #5
A. K. Crebbin - Junior Forester, Sierra National Forest.
L. B. Burkett - Junior Forester, Lassen National Forest.

The five automobiles required for transportation for these crews are being provided as follows: Experiment Station 1, Regional Office 1, State Forester 2, and San Diego County 1.

With a nucleus of four men from the Experiment Station experienced in cover type mapping, the field work should quickly be in full swing and it is expected that field mapping for the entire Southern California Region will be completed during 1931.

Redwood Studies

Person was assigned to the redwood project on December 1 and is devoting most of his time to a review of the work that has already been done in the redwood region. It is planned to spend some time in a general study of the area to determine what part of the problem should be undertaken by the Experiment Station and where the field centers of work should be established.

The first part of December was spent in the redwood belt near Eureka and Scotia in company with Woodbridge Metcalf, State Extension Forester and Mr. Lindsay, an Australian forester now spending some time with us. Redwood problems were discussed with a number of the operators and foresters of Humboldt County and a number of points of interest were visited. Mr. Hine of the Holmes-Eureka Lumber Company and Mr. Dessert of the Dessert Lumber Company accompanied the party on a trip to the woods operation of the Humboldt Redwood Lumber Company and virgin and cut-over areas east of Carlotta. Mr. Scofield, forester for the Humboldt County Redwood Protective Association, and George Wirt, of the Pacific Lumber Company conducted a trip to the redwood nursery near Scotia and a planting operation near Pacific Spur. Because of

the depression in the lumber industry, planting operations have been discontinued by all of the redwood companies except the Pacific Lumber Company which is now planting 800 acres of recently logged land.

Southern California

Forestation.

Planting experiments in the mixed conifer type at 6000 feet elevation were put in shortly after the late November rains. Weaver reports that cold, dry, windy weather during December, instead of expected rains, discounted heavily this attempt at early planting. Although planted immediately after lifting from the nursery and under favorable soil moisture conditions, this stock only one month in the field compares unfavorably with the plantation made last April with stock kept for two months in cold storage. Successful planting in the South is still largely a matter of chance - the chance of guessing correctly when it will rain or blow from the north.

In the nursery all transplant stock has been lifted, puddled and heeled-in/in bundles ready for shipment to the Forests as orders are received. Advantage is being taken of favorable spells of weather to continue the program of planting experiments.

During a short trip to southern California in mid-December, Kraebel attended to the following:

Road-fill Erosion Control Experiment.

The late November rains started germination of seed of some of the species sown on November 21. Barley was up 2 to 3 inches on December 16 and clover had just appeared above the soil surface. The brush-barrier control plot showed the least gullying, incipient gullies always being arrested by the first or second barrier below their point of origin. Run-off from the untreated check plot had badly undercut the toe of the brush-barrier slope. Three breaks in the surface of the oiled plot started horseshoe shaped erosion spots which promise to enlarge uphill during future storms.

The Samuel B. Parish Botanical Society. (of San Bernardino, Riverside, and Orange Counties.)

Following the annual banquet Kraebel addressed this Society on the application of botanical knowledge in forest research. By way of illustration, he described the methods and some results of the fire-succession studies in chaparral, and the cover type map of California. Exhibition of the completed Angeles type map aroused much interest and astonishment at the magnitude and detail of the project.

This Society is unusually active under the leadership of its present chairman, a retired railroad man, possessor of an herbarium of more than 2000 sheets, and a specialist in the cactaceae. Botany as an avocation is popular in southern California where the floral wealth of great deserts and pine forests lie only an hour's drive apart.

Inspection of Henninger Flats Nursery on Mt. Wilson.

Old timers in the Service, who worked in the California District between 1905 and 1915, will remember the rise, decline and abandonment of forest nurseries throughout the State. Henninger Flats in the Angeles Forest was one of the few which left their marks on the landscape, in this case long lines and groups of knobcone and Coulter pine standing today conspicuously above the surrounding chaparral. After having lain abandoned for 20 years, this nursery was reopened in 1928 on a "bigger-and-better" basis by the Los Angeles County Forestry Department. In addition to the government land, occupied under special use permit, the County has purchased the contiguous Henninger homestead and is proceeding with care to plant up the whole area for ultimate recreational use. The Experiment Station acts in a consulting capacity in planning experiments and evaluating results with the planting branch of the County organization.

Fire Research

The field work on the Shasta National Forest visibility study was discontinued in the early part of December due to adverse weather conditions. Visibility maps prepared at this time and other maps previously prepared on a topographic base were examined. The relative value of different points as lookouts, as well as various combinations of points, were compared by means of overlays. But one or two more points are to be selected to give excellent detection in the Upper Sacramento Canyon.

made

Maps/in the field were checked against maps made by the profile method. The profile method compares very favorably in seen and unseen areas except where the topographic map was known to be inaccurate. The profile method has the advantage of allowing the preparation of a visibility map without occupation of the point in question. Its disadvantages lie in a slightly higher cost (if accurately prepared); on errors in the topographic base being carried over into the visibility map and being incapable of detection without field inspection; in the area under the break of the hill where the slopes of a ridge or point flatten out at the top being shown as unseen when in some cases they are seen. This latter is of relatively minor importance as far as the total scope of visibility is concerned.

Some work was done on the development of a set of curves from which one could read the altitude of the lowest point visible over an intercepting ridge. As anyone who has undertaken the preparation of visibility maps will recognize, this is the most difficult problem and the one in which lies the greatest source of error.

The comments of various regions on the proposed revision of the individual fire report form were reviewed. Suggestions for further betterment of the form were made with the idea of simplicity and the securing of information needed for statistical and research purposes.

A conference was called by Director Kotok for the discussion of the most important and necessary fire projects to be undertaken during the coming season. Regional Forester Show, Messrs. Price and Jotter of the Regional Office, and Director Kotok and Messrs. Gowen, Brown, and Curry of the fire staff of the Experiment Station were present. Following the conference and in line with points presented in the discussion, the working plan for the ensuing three months was made.

Products

Heptane.

Hill has completed the office report on this much delayed project and is working on manuscript for bulletin or circular publication.

Land Use.

The study of land use in Eldorado County under Professor Weeks of the Giannini Foundation, University of California, under the sponsorship of the Economic Council Natural Resources Committee, has now become a joint project with the Station, which will participate in analysis of data and establishing conclusions in respect to forest land and problems between it and adjoining other lands.

Woods and Mill Study.

The lumber depreciation phases of the Pickering Lumber Company project, which was well along in the final revision stage for early publication in the trade journals was abruptly halted by the request from the Joint White Fir Committee for a preliminary report on the whole woods-mill study with reference to that species. All hands were diverted to the rush job, the punch cards were sent back from Madison, and the tabulating machine leased by the University of California was temporarily hired for our use. A memorandum was prepared for the December meeting of the lumbermen's committee setting forth a summary of the white fir depreciation data to be published and outlining the work to be done on the woods-mill study.

Information concerning white fir degrade which may have interest is as follows:

(Quoted from the memorandum)

"On a value basis, air dried fir depreciates as follows (in the pile):

C & Btr.	7.5% loss
#1 Com.	4.7% "
#2 Com.	5.8% "
#3 Com.	2.6% "
#4 Com.	9.3% "
#5 Com.	2.0% "
Mill Run	5.3% "

Mill run dry value (excluding timber and ties) based on 1929 prices, was $22.95 green and $21.73 rough dry.

By trimming and ripping to realize highest values, the dry average selling price, rough, was raised to $22.45. Deducting the average cost of trimming and ripping, which was $.13 per M feet of green material, the gain from rough dry to remanufactured rough dry was $.59. The loss from green to remanufactured rough dry was $.63, including the cost of trimming and ripping as a loss. This is equivalent to a 2.7% drop in value.

The foregoing rough-dry losses are merely an indication of what takes place in the yard. To these must be added the losses in surfacing. Summaries of surfacing changes are now being computed. Since practically all seasoned fir is surfaced before shipment, the picture is not complete without reducing the rough dry to a surfaced-dry basis.

There is considerably less degrade in kiln drying white fir than in air drying. Practically nothing but 6/4 stock was being placed in the kilns when the depreciation study was under way; therefore, we have data only for this thickness.

Kiln Drying Degrade, White Fir

6/4 x 8" wide. Green to rough dry.

C & Btr.	6% degrade by volume
#1 Com.	10% " " "
#2 Com.	10% " " "
#3 Com.	3% " " "
#4 Com.	5% " " "

After trimming and ripping, the net losses in value, including cost of extra handling, are:

C & Btr.	1.5% loss
#1 Com.	2.0% "
#2 Com.	1.2% "
#3 Com.	0.1% gain
#4 Com.	1.4% loss

The kiln dried fir was brought down to a moisture content of about 18%, with many pieces running above 20%. The air dried stock, however, was exceptionally dry, showing an average of only 10% moisture.

Cause of Degrade

Check is responsible for most of the degrade in air dried C & Btr. and #1 Common; loose knots and check in #2 Common; loose knots, split and check in #3 Common; and split in #4 Common.

In Kiln dried fir, split is the principal defect in all grades.

Degrade in air dried C & Btr. can be reduced somewhat by more care in piling. Quite a little check in C & Btr. tallied during the study resulted from unnecessary exposure to the sun.

An appreciable gain was made by trimming and ripping in all grades. This appreciation was chiefly from material insufficiently manufactured in the sawmill (with the exception of C & Btr., of course). In 6/4 #1 Common, for example, only 11% of the total material raised in grade by trimming and ripping was from the degraded portion. The remainder was really C & Btr. except for a knot on one end or on the edge, or a little too much wane, all of which could be easily removed by trimming a foot or ripping off an inch or two.

More carefully manufactured grades would not yield as much by remanufacture as shown in these studies. There would be little difference in original depreciation, however."

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General

McCarthy and Kellogg attended the meeting of the Society of American Foresters in Washington at the end of the month. This trip included work on two committees of the National Society of which McCarthy was a member. One committee is compiling a forest type classification for eastern United States and the other prepared a report on industrial forestry.

While in Washington, arrangement was made for the computation of a yield table for plantation grown black walnut. Kellogg will later report to Washington to supervise this computation.

The Station regrets to announce the loss of Barrett through transfer to the Appalachian Station. Barrett has served this Station for a period of approximately two years. His loss is due to inability to meet a salary increase offered outside.

Early in the month the Station received a visit from R. C. Hall who came into the region to attend the meeting of the Central States Forestry Congress. Hall's visit gave us the opportunity to talk over with him the forest tax situation in the Central States region.

Central States Forestry Congress

Special reports have been made on the meeting of this Congress in Indianapolis so that only a brief record is needed here. The Congress met for its first session on December 3, 4, and 5. McCarthy, Day, and Kellogg attended, each taking a part in the program.

Permanent organization of the Congress was left to a board of fifteen directors who are empowered to name a president for the coming year. Cincinnati was chosen as the place of the next meeting without a fixed date.

State Forester Wilcox has been active since the close of the Congress session in getting the proceedings in shape for publication. He expected to get them into the printer's hands during December.

Oak Yield Study (Ts-12)

Yield data on the oak plots have been tabulated and forwarded to Washington for application of volume tables and transfer to the cards for the tabulating machine. Barrett completed this tabulation with the assistance of one temporary employee.

Barrett also completed the report of establishment of a plot on 163 acres of land at the Clark County State Forest near Henryville, Ind. In this work we have a very efficient standard for the establishment of extensive permanent plots for the study of all-aged stands. State Forester Wilcox has indicated his desire to have our Station prepare a plan for the further management of this tract.

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INTERMOUNTAIN FOREST AND RANGE EXPERIMENT STATION

General

Mr. Chapline spent ten days in November at this Station. While here he went over Nelson's black grama manuscript, Renner's bibliography and plans and other matters relating to range research.

During December the office handled the galley proof of Forsling's erosion and streamflow bulletin, the editorial changes in Forsling's and Dayton's artificial reseeding manuscript, Board of Review work on Canfield's manuscript on effect of clipping on black grama and tobosa grass and forwarded Nelson's manuscript on black grama to the editor.

Forsling prepared a paper on erosion on uncultivated lands in the Intermountain Region which was read at the American Society of Agronomy meeting in Washington in November.

Influences

The report of the Utah Flood Commission, of which Forsling and Reed Bailey and R. J. Becraft of the Utah State Agricultural College are members, was forwarded to Governor Dern on December 30.

The commission concluded that the flashy floods and mud-flows in Utah, although due directly to heavy torrential rains on steep slopes, were indirectly the result of sparseness of vegetation due in some cases to natural barrenness or semi-barrenness of the watersheds, but in most cases to denudation by overgrazing, fire and over-cutting of timber, named in the descending order of their importance. The floods in Davis County, the worst in the State, were almost wholly the result of man-caused denudation. The floods originated on a relatively small area at the heads of the steep canyons where there has been very heavy overgrazing on privately owned land by both cattle and sheep.

The study revealed that similar rains have occurred in the past and probably will continue to occur at intervals of a few years to several decades, but there is no evidence of a similar frequency of floods. The geological evidence shows that the floods of 1923 and

1930 mark a distinct departure from the normal geological erosion that has been going on since Lake Bonneville receded to approximately the present level of Great Salt Lake, twenty thousand years or more ago. The floods of 1923 and 1930 in places cut as great a depth in the Lake Bonneville deltas as had been cut in all the years since Lake Bonneville receded. Moreover, had erosion been going on since Lake Bonneville at a rate comparable to that during the recent floods there would have been huge alluvial fans several miles in length in front of the canyons, whereas these deposits are exceedingly small. Sand, gravel, and rocks, including boulders up to 50 tons in weight, were deposited on rich farm lands, formerly lake bottom, where the original soil was a silt. Several facts relating to erosion and deposition on the shores of Lake Bonneville, formerly overlooked by geologists, were brought to light in the study.

The Commission recommended regulation of grazing, fire prevention, reseeding and planting and small dams and other works as a means of flood prevention, and the construction of catchment basins at the mouths of the canyons as a flood control measure until the watersheds have been revegetated.

The last month and a half has been a busy one on the Boise influence study. All the information obtained by the range-erosion survey on the Boise River watershed in 1929 and 1930 is being coded for placing on punch cards for analysis. Two men were loaned by Region 4 and one from another Station project to complete the coding work. Renner left for Washington just before Christmas to spend two months for the purpose of analyzing the erosion data and doing further work on his range bibliography.

Spring-Fall Range Study

Stewart and Pickford have completed a survey of spring-fall range use by 92,000 sheep in the Heber City community in Utah. A survey involving 95,000 sheep in the Fountain Green community was completed earlier. These surveys bring to light some important points on the influence of spring-fall range on range sheep production.

Range Management.

Comparison in Types of Range Sheep Production.

The Fountain Green community in central Utah is the home of most of the sheep owners in the famous Jericho Wool Pool. The Heber City community is 27 miles northeast of Provo, Utah, and about 60 miles north of Fountain Green. There is but little spring-fall range near Fountain Green and a considerable area of the best type of this range

near Heber. The available spring range near Fountain Green is much more closely grazed than that at Heber City. So far as physical factors are concerned, the area and condition of the spring-fall range is the chief difference in the two locations. Either as a result of this difference, or at least closely correlated with it, there have grown up two distinct aspects of the range sheep industry.

The Fountain Green herds are trailed an average of 200 miles from their summer ranges on the Uinta and Manti National Forests to Snake Valley in western Millard County, Utah, "the West Desert", where they are wintered. The Heber herds trail about 100 miles from the Uinta and Wasatch National Forests either to the "West Desert" or to the "East Desert" in the Duchesne-Green River winter range. The following table summarizes certain information relative to sheep production in the two communities.

Comparison of Fountain Green and Heber City Sheep Grazing Operations

	Fountain Green	Heber City
Total number band units (winter range)	.26	20
Total number sheep represented	93,750	92,281
Number of owners represented	42	41
Av. No. sheep per owner	2,232	2,251
Av. No. sheep per band (winter range)	3,606	4,614
Av. No. days trail winter to spring range (days).	19.2	7.4
Av. No. days on early spring range (in reality on trail)	18.5	1.1
Av. No. days on lambing range	47.1	55.3
Av. No. days trail, spring to summer range	1.9	2.2
Av. No. days on summer range	90.6	88.5
Av. No. days on fall range	11.2	26.8
Av. No. days trail, fall range (includes trail from summer to fall range)	12.5	2.2
Av. No. days trail, fall to winter range	13.1	11.3
Av. date on winter range	11/5	11/7
Av. No. days on winter range	151.0	170.0
Av. mileage summer to winter range (miles)	198.3	107.2
Av. total time spent on trail (days)	66.2	24.2
Av. lamb crop (per cent)	84.6	94.0
Av. wt. lambs sold (pounds)	68.4	74.4
Av. per cent of total sales (wool)	55.6	32.4
Av. per cent of total sales (sheep)	44.4	67.6
Av. lambing date	5/16	5/8
Av. date lambs cut out	10/2	9/19

The Fountain Green sheep are all high-grade Rambouillets and the herds are maintained by saving the ewe lambs from purebred Rambouillet rams. The Heber City stock was originally the same type as the Fountain Green herds but during the last 15 years has been crossbred on Lincolns or Cotswolds until the ewes are largely crossbred. The bucks used now are chiefly Suffolks or Hampshires and mutton type of lambs are produced. Most of the Heber City lambs are sold as killers and go direct to the butchers. The Fountain Green lambs go to the feed lot. Heber City owners get an average lamb crop of 94.0 per cent and Fountain Green 84.6 per cent. The lambs weigh 74.4 and 68.4 pounds respectively. It is also shown in the table that wool sales are more important in the Fountain Green group and lambs are the most important in the Heber group.

As might be suspected from the figures given, the Heber sheepmen own their spring-fall ranges and feed corn regularly as a supplemental winter feed. All of these differences in the two communities are related directly or indirectly to the differences in the spring-fall range situation.

Influence of Precipitation upon Range Forage Yield during 1930.

Since 1924 annual forage yield records have been secured on five clipped correlation plots at or near the Great Basin field station on the Wasatch Plateau in Utah. These plots are located in three vegetative zones, the oak brush (transition, 6800-7800 feet); aspen-fir (Canadian, 7800-9000 feet); and spruce-fir (Hudsonian, 9000-10,300 feet).

The main growing season on the Wasatch plateau occurs during the months of June, July and August. Precipitation records obtained for the past 16 years show an average of 3.44 inches for the oak brush zone; 4.56 inches in the aspen-fir zone and 4.32 inches in the spruce-fir zone or an average of 4.11 inches for the three zones. June is the driest month with approximately 19% of the June-August precipitation. The remainder is equally distributed throughout the other two months. Although the precipitation for the past growing season for the three zones averaged 40 per cent above the 16-year seasonal average, 61 per cent of the precipitation fell during August, coming too late to do much good because the forage had practically matured in two lower zones.

The yield of grasses on five correlation plots in the three vegetative zones was 24 per cent below the seven-year average. The yield of grasses the past season varied from 7 per cent below the average in the oak brush zone to 37 per cent below in the aspen-fir, while in the spruce-fir the yield was average. The growth of grasses in the aspen-fir zone had practically ceased and seed was ripening rapidly by August first because of the rather dry conditions that prevailed during June and July. The heavy rains in August came too late to revive the matured forage but they did delay seed maturity until nearly September first. Rainfall was sufficient in the spruce-fir zone during July to keep the grass growing and was followed by splendid rains in August.

Silviculture

Fire studies have taken the bulk of the time during December. Coding of all lightning fires on the seven fire forests was completed and the statistical analysis of individual fires for 1921 to 1930 was started. Abstracting and coding of the information from individual fire report forms will probably take five man-months. The Regional office is providing the personnel and the Station is supervising the work and will be responsible for the analysis of the data. It is obvious that complete coding will require considerable reference to the field and may call for a trip to the various headquarters to run down doubtful or lacking information.

Forest Biology

During most of November, Locke was engaged on an investigation of predatory animal poison work for the Biological Survey in company with Mr. Goodwin of the American Museum of Natural History, representing the American Society of Mammalogists.

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NORTHERN ROCKY MOUNTAIN FOREST EXPERIMENT STATION

Compilation of annual field records of permanent reproduction and cutting plots by Office Assistant Fisher and preliminary analyses of the data by Haig occupied most of the time in silvicultural studies this month. It has not been possible until now to do any office work on this large series of plots and quadrats during the four years that the field work has been in progress. Much important information is bound up in these records, particularly information on seed trees and seed production, including some new light on reproduction resulting from stored seed, seed produced the fall before logging or fire, and seed produced by residual trees following such opening of the stand. Management has been anxious to have the progress results of this work made available. So far the computing work has consisted chiefly of converting the reproduction records for over a thousand screened and unscreened quadrats to values per acre and transferring them to office forms. The analysis has been of only the most preliminary sort to get the outstanding results for use in presentation at the annual Investigative Meeting in January.

An interesting incident was a day in the field in which Haig joined several members of the Regional Office checking the practicability of the stocked quadrat method for land exchange work in Region 1. As a matter of record, this stocked quadrat method (the same in principle as that described in the September report of the Pacific Northwest Station)

has been employed in Region 1 in studies of cut-over areas for the past five field seasons. Over most of this period the stocked quadrat principle, i.e., the use of percentage of area stocked as the critical value as opposed to number of seedlings per acre, was employed in connection with the mil acre unit. This unit, however, was never regarded as entirely satisfactory and in February, 1930, Haig, after some preliminary study of pertinent yield table figures, proposed a 12' square as a more logical unit. Actually the 13.2-foot (4-mil acre) square was adopted (Region 1, Circular letter S, Feb. 10, 1930) because of its convenience in field use. The method was employed in the Region to a considerable extent during the past field season. On the present field trial the object was to check up on various methods of distributing the 4-mil acre samples over a given area to obtain most effective results. Everyone present agreed that the 4-mil acre is a convenient field unit and readily adaptable to land exchange work.

December progress on the statistical study of the Region 1 fire records included (1) appointment of Regional Forest Inspector Hornby to represent the Regional Office in this work, (2) agreement with the Washington Office and the California Station on a few final changes in the code system to be used, (3) preparation of both code and compilation sheets in forms least subject to error in reading and transcription, (4) preparation of a statement of the types of errors most easily made in coding, how they may be avoided, and how to check the coded data to detect and remove errors of coding, (5) final selection of the 14 deputy supervisors from the principal fire forests who are to examine, correct and code their own reports. As Mr. Hornby is also assigned to the Transportation Study in this region, his selection to represent Administration in the Hour Control Study insures the best possible co-operation.

Gisborne spent considerable time in December going over in detail with Hornby both the mechanics of using the Hollerith system and the character of information included by the present code system. Hornby also studied the most recent Show and Kotok publication on Hour Control so that our work may be guided to produce results comparable with those obtained in California. Several controversial or doubtful points have been listed for special attention during the analysis.

One suggestion by Mr. Jefferson of Operation concerning the machine tabulation and analysis of the fire reports that is being watched closely may have a far-reaching effect. It is obvious that previous methods of compilation of the fire records, namely sheets A to K and the Summaries, have not given all of the information that is needed and that can be obtained from the original reports as a basis for current checks on the efficiency of fire control. The need for the present statistical analysis proves this fact. Furthermore, the punch card method should give all of the information carried by sheets A to K and the Summaries. Consequently it may be possible in the future to transfer the data on the original reports to punch cards immediately after the close of each season, and then to sort and tabulate these cards and data, rather than to

rely upon the laborious hand compilation required by sheets A to K. By such a change the usual Summaries may be obtained just as quickly as heretofore, and the important additional information obtained as a by-product. Or viewed in another way, by making the complete statistical analysis currently the A to K data may be obtained as a by-product. More information with less labor and at less cost is the goal. If we can do away with the A to K's one man on each Forest might really relish the small job of coding 100 to 200 reports annually.

Coding of the 1930 lightning storm reports for R-1 has turned out to be a larger job than expected. The new code system requires several computations for each report, which were not required by the previous report form and code system. The new method, however, gives much more data in a more useable and practical form than the old method. Naturally these computations slow up the rate of coding. In addition, it is now obvious that there were more lightning storm reports submitted for this region in 1930 than for 1929, the numbers comparing as about 4500 to 3780 respectively. How the comparison stands on the basis of number of reports per station is not yet known as there are still reports for two forests to be coded. Obviously there were more lightning storms in R-1 during 1930 than during 1929. This condition was not generally recognized.

Until these data are punch carded and analyzed we cannot decide whether the storms of 1930 were wetter or drier than those of 1929, but it seems probable that one of the big differences between these two fire seasons will be found to lie in the different character of the storms, rather than in a different frequency of occurrence. In fact, more lightning storms may prove to be an advantage - if they bring more rain.

After a number of weeks in Portland on revision of his western yellow pine timber growing manuscript, Weidman returned to Missoula December 19. Following conferences during the last week there with numerous men in and out of the Forest Service, some little reworking of parts of the report is still necessary before submitting to Washington. It is planned to finish this work immediately after the Investigative Meeting which is to be held January 9 and 10 this year.

Weidman and Haig attended the Northwest Scientific Association Meeting at Spokane, December 29 and 30, the former presenting a paper on sources of seed of reproduction following fire and logging in western white pine and the latter one on stand tables in the same forest type. The Association at this meeting voted to accept affiliation with the American Association for the Advancement of Science on the basis of a regional Academy of Science.

Thompson reports winter work progressing satisfactorily at the Priest River Branch, where he has devoted outdoor work to fences, roads,

buildings; and wood supply and indoor work to compilation of phenological and certain fire study records and to property and inventory matters and improvement plans requiring attention at this time.

PACIFIC NORTHWEST FOREST EXPERIMENT STATION

General

The month has been somewhat interrupted by either long or short periods of leave of nearly everyone in the organization. However, the accomplishments of the month have been considerable and the number of contacts with outsiders unusually large.

Director Weidman was here until December 18 working on his minimum requirements report for Western yellow pine when he returned to Missoula.

A joint committee of the Regional Office and the Experiment Station on forest and range experimental areas and natural areas has been appointed and is at work. The Experiment Station is represented by McArdle and by Munger as chairman.

Munger spent two days in Seattle where he attended the annual meeting of the Washington Forestry Conference and gave a paper entitled "The National Survey of Forest Resources Now In Progress in the Douglas Fir Region". He also spoke briefly on the Forest Survey before the monthly luncheon of the Puget Sound Loggers Information Association.

At a recent meeting of the Portland U. S. D. A. Club, Munger was elected President for the ensuing year which will give the Station an added point of contact with the other Bureau officials of the Department here.

The Director has spent considerable time on Committee work in connection with the Portland Chamber of Commerce and otherwise on state forest policy preparatory to the forthcoming legislative session.

An issue of Forest Research Notes (No. 5) has just been prepared for distribution to our list of about 300.

Forest Survey

The weather has been favorable for field work for this season of the year and has been carried on successfully by most of the timber survey force when they were not on leave.

Wernsted has prepared a type map for a part of Clackamas County from the oblique airplane photographs which he made. Also the Fairchild Airways have photographed vertically from a high altitude a small piece of this county. A conference with these people and Wernsted was held on the whole subject of the use of aerial photographs on this work.

G. H. Lentz, of the Southern Forest Experiment Station, was here studying our methods the first two weeks of the month and M. I. Bradner of R-1 spent a couple of days in the office for the same purpose.

As a result of conferences with the Regional Office, very satisfactory arrangements have been completed for starting an inventory on the remaining national forests and for the assignment of personnel to continue the work next year on the other forests.

Type maps of two counties have been completed and sent to the Director of the Oregon Agricultural Experiment Station for his use in making an estimate of the forest acreage which is likely to be withdrawn for agricultural purposes in the next thirty years. This is a preliminary to a conference with the State Experiment Station officials to work out the technic.

A tentative working plan for the strip method has been prepared and submitted to several parties for criticism since it is the plan to try out the stripping method by way of comparison with the compilation method on a couple of counties.

Yellow Pine Growth and Yield Study

Two computational assistants continued their work with Meyer on the western yellow pine growth study throughout the month. Some of the data are finally rounding into shape so that analyses may soon be attempted. The even-aged plots in second growth stands check out fairly well insofar as the gross values of International B.F. volume and total basal area are concerned with Behre's yield tables for the Inland Empire. However, there are striking differences in the total number of trees and the size of the average tree. In all probability a new table will be constructed combining the basic data of the two investigators, which will then apply to Eastern Washington and Oregon as well as Idaho.

Tentative computations also show that contrary to expectations the trees of the reserve stand in a pine selection cutting when released do not deteriorate in form (that is, become less cylindrical) especially when the form class is originally low, less than .70. On the other hand, when the original form class is high, or above .75, there is often a slight deterioration. In other words poor form classes improve and good form classes become somewhat poorer after release.

Meyer attended the annual meeting of the Northwest Scientific Association at Spokane and delivered a paper before the forestry section entitled "The Effect of Dry Cycles Upon Forests and Some Forest Uses".

Natural Reproduction of Douglas Fir

Data collected during the past season on various phases of the study are being worked up. On the sample areas where physical factors are being measured, only 5.3% of the 1930 seedling crop survived; weekly maximum surface soil temperature on this open slash burned area ranged from 140° to 164° F during the period from June 4 to September 9. The check of germination under virgin timber showed that a portion of the Douglas fir seeds that fall germinate but by far the greatest percentage of the seed loses its viability by decay before the second germinating season arrives. Some of the seeds that germinate just crack open while others produce seedlings but the seedlings seldom live longer than a few weeks.

Isaac took advantage of the favorable seed year and prepared a wall mount of the seeds of all the conifers native to the Northwest. The exhibit which consists of a 20 x 24 inch panel in a frame is not only decorative but educational as the seeds with wings attached are mounted under glass and labeled with the common and scientific names.

Oregon State College forestry students are required to work on some minor research problem during the last half of their junior year and to write a thesis on some forestry topic during their senior year. A number of them have selected some phase of the natural reproduction study and six of them visited the Station during the month for assistance and material.

Through Supervisor Harpham of the Umpqua National Forest, a request came in for advice in planting up part of a Roseburg school ground. The planting is to take the form of an arboretum of native species of trees and shrubs. The idea looks like good PR and may be used elsewhere. The plantation should stir up some interest in forestry among the students and the people of the community and help them to know the native trees and shrubs.

Phenology

In the Forestry Section of the annual meeting of the Northwest Scientific Association in Spokane, Kolbe read a paper entitled "Phenology an Instrument of Forest Administration". While at this meeting Kolbe, I. T. Haig of the Northern Rocky Mountain Station and A. L. Gibson of the Forest Insect Experiment Station at Coeur d'Alene, Idaho found time to exchange notes on the phenological work as it is now being carried on in the regions. In regions one and six the identical system is in use. The choice of species that are observed being the only difference. At this conference much of the discussion centered around the handling of the data in the office. The cumulative office record card in use since 1928 by this Station was generally approved.

Fire Studies

Statistical Analysis of Fire Reports

Final arrangements are made for coding the national forest fire reports for punched card analysis. This work will go forward simultaneously with analyses now being made to establish hour control standards. For the latter a tentative working plan has been prepared by McArdle after various conferences with Brundage of the Regional Office. It was decided to make a "hand analysis of fire reports for the Blue Mt. group of forests for several reasons:

(1) Each fire dispatcher has an active part in analyzing the data for his forest - a procedure which thus far is proving to be of great value to the dispatchers and which also "sells" the idea to them,

(2) To test the plans recently made for coding the fire report data - and as a result, several changes were made in the original plan, and

(3) The hour control - travel time information is wanted immediately. Preliminary work was done with reports from the Whitman Forest and the Umatilla forest records are now being analyzed with the assistance of fire dispatcher Clouston on detail at the Station.

It is too soon to speak of results that will hold for the entire Blue Mt. area but it is quite evident that the hour control standards for the Blue Mt. forests will be less exacting than those recently set up for California.

Douglas Fir Slash Disposal

A small amount of computational work was done during the month and McArdle is about ready to write a progress report on this study.

Weather and Fuel Relationships

Simson spent nearly the entire month assembling and working over data to be used in a forthcoming report on weather and fuel relationships. The Station's phenological data promises to be useful in connection with this study as a means of dating various points in each year's fuel moisture curves.

The presence of Central Dispatcher Angell of the Whitman National Forest on a detail to the Station made it possible for Simson to discuss rather fully with him the various aspects of the static-thunderstorm study.

Forest Insurance

The work on the forest insurance study during December related mainly to the phase of the work which has to do with the analytical study of the fire reports, though considerable time was devoted to the general working plan, and this was brought, in final form, through the introduction and plan for the first phase, and the detailed field analyses of burned areas.

In connection with the preparation for undertaking the second phase, the analytical study of the fire reports most of the time during the last two weeks of the month was devoted to actual detail work with McArdle on the fire control study for the Yellow Pine region. This was done for the purpose of learning details of technic that have been developed in the course of this work, the idea being that it would help Shepard to avoid mistakes in procedure and give him the benefit of principles already learned in this closely related work. The work during the last two weeks was, of course, considerably broken up by the holidays but Shepard feels, nevertheless, that a considerable amount of real benefit was gained from the time devoted to the fire control study.

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SOUTHERN FOREST EXPERIMENT STATION

General

On December 18th Professor Walter Mulford of the University of California was a Station visitor. During his two day visit he had conferences with a number of the staff members and made a short trip with Wakeley and Chapman to Bogalusa Louisiana where he was shown the plantations of the Great Southern Lumber Company.

Dr. Ziegler, Pessin, Wahlenberg and Sinclair represented this Station at the Land Use Conference of Mississippi. This Conference was called at Jackson to consider the status of nineteen and one-half million acres of idle and wooded land in Mississippi. As the discussion progressed the production of wood and beef was favored as a likely solution of the problem. The concensus of opinion, however, was that the conditions were unsuited for the production of beef, and that wood production was preferable. In his presentation of the work of the Southern Forest Experiment Station Dr. Ziegler emphasized the financial feasibility of using sub-marginal agricultural land and present cutover land for growing new timber crops.

Dr. Pessin attended a number of the meetings of the American Association for the Advancement of Science, which were held during the

holidays at Cleveland. At the joint session of the Botanical Society of America and the Ecological Society of America he read a paper entitled "Natural Regeneration of Longleaf Pine".

On December 11 and 12, Dr. Ziegler attended First Extension School of Forestry at Pine Bluff, Arkansas. This meeting was called by the State Agricultural College through the State Forestry Extension Agent, Mr. Gillette. A considerable amount of local interest was aroused in forestry problems. Contacts were made with several progressive lumber companies looking toward Financial Aspects Case Studies of their Properties.

Naval Stores

At Stark during December raking was finished around the trees on the Sampson, Kingsley and Raiford tracts. Fire lines have also been raked around the Kingsley and Raiford tracts. The Sampson tract will be burned as soon as conditions are right. Tins are ready for placing on a 1000 or more trees which will be chipped at Kingsley Lake; also a sufficient number of cups have been cleaned to take care of these trees.

Harper finished his preliminary report on The Effect of Turpentining on Tree Growth, and left for Washington about the middle of the month. The trees to be used in the advance streak test are ready for chipping.

Averell, Heyward and Diller were out for three weeks on a trip into southern Alabama and Mississippi. Five or six tracts were visited which had been unburned for a number of years. A collection of plants was made on burned and unburned tracts with the idea of determining the effect of burning on the plant growth. The party visited the International Paper Company mill where they were told there that dense grown trees furnished the best pulpwood. Where the annual rings were 1/2 inch wide the wood was thrown out as being unsuited for pulp purposes.

Forestation

During the early part of the month Wakeley and Gemmer supervised the planting of 7.2 acres of longleaf pine on the Metts Administrative Unit. They also planted a series of planting units of exotic species, using 1-0 and 2-0 stock. Among the list of species planted are the following: western yellow pine from Arizona, western yellow pine from Lassen County, California, jeffrey pine from Lassen County, scotch pine, pond pine, monterey pine, swiss stone pine, coulter pine and apache pine; Cupressus arizonica, and Cupressus macrocarpa. The Great Southern Lumber Company at Bogalusa, La., planted 875 acres to slash pine this year. The spacing used was 6 x 8 feet, and the total direct cost of

planting was $2.62 per acre. This does not include a cost of 70¢ per acre for fencing and a charge of approximately 50¢ per acre for overhead.

Measurements

Coile spent a portion of the month constructing an alinement chart volume table for shortleaf pine. This table has been constructed for the peeled stem in cubic foot units.

Hardwood Growth and Yield.

Bull, Cruikshank and Winters assisted Mr. J. A. Putnam, timber buyer for the Thistlethwaite Lumber Company at Opelousas, Louisiana, in cruising a second growth timber holding of about eleven thousand acres. This area is entirely within the bottomland hardwood region and is one of the few areas that have been set aside by their owners as a timber reserve where the second growth timber is being protected. An attempt was made to map types on this area. Type mapping in the second growth bottomland hardwood forests presents unusual difficulties. The timber stands that are found upon these areas depend quite largely upon the species that were removed at the time of logging, and upon the mixture of species that were allowed to remain. A further complicating factor is the existence of low (4 to 6 feet high) ridges. These ridges were presumably at one time river beaches and as the river moved its bed these beaches were left in the midst of surrounding level delta land. Due to differing soil and moisture conditions these beaches bear a different type of timber from the lower delta land. It is apparent that type mapping an area containing these low ridges presents an unusually difficult task. The type mapping must be done upon a very broad general classification using a few broad types or along a very intensive manner using a great number of types.

Mr. Putnam spent some time teaching the hardwood growth and yield crew the methods that he employs in cruising hardwood timber for private companies. It was a revelation to those of us who have worked in pine regions to see the type of material that a hardwood operator must leave in the woods if he is to make his operation pay.

On the last field trip the crew brought back a section of cherry bark oak (Quercus rubra leucophylla) that had grown to a diameter of approximately 24 inches at a height of 2 feet above ground in approximately 20 years.

Hardwood Survey.

Lentz spent two weeks in Portland in order to become acquainted with the work of the Forest Survey staff for the Pacific northwest. He was able to see how the Agricultural Stripping was being done, how the mapping in place of areas not covered by cruises was carried on and how

Jim Gerard and the check cruisers made their check estimates. In conferences with Director Munger, Andrews, Cowlin, and Mathews the application of the West Coast methods to southern conditions was fully discussed. The possibility of using aeroplane photographs was taken up with the staff, Wernstedt, of the Region office and a representative of the Fairchild Aero Corporation. The concensus of opinion was that it would be very difficult to recognize the hardwood types from aeroplane photographs but that the photographs would be helpful in control work for running strips.

No extensive strip work has as yet been done by the Survey crews but plans were being made by Andrews to run strips in Lewis County Oregon. For the hardwoods in the South it seems as though the strip plan will have to be used as a lack of adequate surveys and timber cruises will preclude the use of the compilation method.

At Berkeley Lentz talked over erosion plans and problems with Kotok, Lowdermilk and Kraebel, and saw the soil tanks which Lowdermilk and Sundling have used in their work. With Wieslander he talked over the problem of type mapping. The California Station is concentrating on getting a complete type map before any estimating will be attempted.

Erosion.

Meginnis spent a good portion of the month in the preparation and installation of a library classification system for the erosion literature. He found that the decimal system, commonly used by foresters, gave insufficient detail for the needs of the erosion project, and has evolved a working scheme that enables him to handle the erosion library in a very satisfactory manner.

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SOUTHWESTERN FOREST AND RANGE EXPERIMENT STATION

The month of December has been devoted mainly to office work. This applies especially to the Forest Management personnel. Several of the men working on erosion projects spent a large part of their time in the field. Plans for improvement work under approved or anticipated appropriations for unemployment have demanded considerable time and thought. If all these appropriations materialize the benefits to research will be very substantial, though at a temporary sacrifice, because supervision and other administrative duties connected with improvement projects will leave little time for research up to July 1.

Forest Management.

A thinning plot of 4.2 acres and a control plot of 0.8 acre on the Prescott, established in 1925, were remeasured in October, 1930. According to the record in 1925, the thinned plot contained 285 trees per acre, mainly between 4 and 13 inches d.b.h.; the unthinned control contained 772 trees per acre mainly between 2 and 11 inches d.b.h. Stump counts in 1925, indicated an average age of 41 years, a few trees being as much as 5 years above or below the mean. The following deductions are made from the 1925 and 1930 measurements:

The average diameter growth of all trees on the thinned plot for the 5-year period was 0.58 inches, and on the unthinned plot 0.26 inches.

In both thinned and unthinned plots the greatest average accretion was in the higher diameter classes. This indicates that the larger trees are relatively less affected by competition than are the smaller ones. On the thinned plot the average diameter growth was 0.77 inches in the 10-inch class, as compared with 0.42 in the 4-inch class. On the unthinned plot the corresponding figures are 0.56 and 0.19.

Comparing the same diameter classes in thinned and unthinned plots, the acceleration due to thinning is generally around two tenths of an inch.

Growth on the thinned plot is closely associated with condition and size of crown. In recording the 1930 measurement, the crowns were classified ocularly, judging condition by appearance of foliage, and size by estimating spread and length in relation to d.b.h. The method is admittedly crude, but it is the only one that can be used quickly in timber work. Relative growth by crown classes is shown in the table below.

Crown Class based on condition and size (a)	Number of trees in class	Avg. Diam. growth of class	Trees growing over .5 inch	Increment Class containing max. per cent of trees
		Inches	Per cent	Inches
Good - large	165	0.83	88.0	.8
Good - medium	619	0.62	60.0	.6
Good - small	94	0.39	12.8	.4
Medium - medium	83	0.48	30.1	.5
Medium - small	86	0.36	7.0	.3
Poor - medium	21	0.31	4.8	.2
Poor - small	46	0.26	6.5	.3

(a) In each class the first work refers to condition and the second to size of crown.

It is evident that the classification gives consistent results on the theory that growth is proportional to area of leaf surface. Obviously, root space is also a factor, but the thinning was executed with the object of giving each tree an area of ground space approximately proportional to its crown spread. The relation between crown classes is most strikingly brought out by omitting the two classed as of medium condition, since they do not represent a clear-cut class. Nevertheless these classes are in line with the general relationship. The results confirm the heretofore unproven theory, long used as a basis for timber-marking in Region 3, that capacity for growth, other things being equal, is proportional to effective crown area and root area.

Range Management and Forest Influences

Investigations on management of the brush belt, once primary projects, are now continued as minor lines of work. It has been considered advisable to keep up some records because of the contribution they will make to contemplated work. These records consist primarily of measurements of vegetation, as the charting of quadrats in permanent enclosures, panel enclosed grazed plots, and on open range, largely in connection with the soil erosion project. December prior to Xmas was so spent in the field in the vicinity of Roosevelt. All the force gave some time, Bliss and Cassidy continued throughout the period. As was expected, grass behavior was in line with the season. A decided tendency toward increase was recorded, the upward swing in trend that will counter balance the downward course that resulted from the very unfavorable year of 1928.

Profile stations were remeasured in protected, winter grazed, and yearlong used plots established for the study of erosion on grass depleted soils of granitic origin. These stations were last measured in April, 1930. The measurements showed very preceptible changes that have occurred since that time. There was very little semblance of stability except for those areas where herbs have reached a state of revegetation to now constitute a fair cover after five years' protection. The heavy summer rainfall, about 14 inches, since June, has caused an excessive movement of soil.

An exceptional stand of summer annual grasses once again indicated the influences of control exerted by even a temporary cover of annual grasses.

Growth of annual grasses on steep slopes gave a particularly clear picture of the influence of soil and soil depletion on plant production. Annuals grew in heavy stands on the temporary soil deposits at the base of steep slopes. They shaded to a thin stand and low height growth at mid-slope, while near the top, where soils have been almost entirely removed, very few plants were supported and these were in the average less than a fourth as large as were plants at the base of the slope.

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The regular field season for 1930 was closed on November 1 when Rooser moved to Colorado Springs from the Fremont Station. The early part of November was given largely to cleaning up accumulated correspondence, preparing inspection memoranda and rearranging the library and compilation files.

Toward the end of the month, the data obtained during the summer in the erosion phase of the grazing protection project under study near South Platte on the Pike Forest were compiled and embodied in a progress report. To date, all information is based on the results of vertical and horizontal profile measurements made at a number of permanent channel monuments within fenced and open, planted and unplanted, plots. While this method of study leaves much to be desired from the standpoint of scientific accuracy and conclusiveness, the results are of some value insofar as they depict roughly the cumulative effect of the various erosion agencies upon the tendency of the loose granitic soil of the foothills region of the Central Rockies to erode.

In eleven years, horizontal displacement, by side cutting in channels, has progressed more than three ttimes as rapidly outside as within the fence; the percentage of increase in profile width being respectively 76 and 21%. In channel depth, an average change of 19% has resulted, but in opposite directions. On the grazed area, this change denotes a decrease in depth due to filling in by sedimentation.

The influence of planting on the progress of erosion is still quite obscure, and is probably negative. The planted stock is developing very slowly, as may be expected on a thin, sterile soil, and also poorly as the result of excessive porcupine activity. If anything, erosion has been a bit more pronounced on the two planted than on the unplanted plots (grazed and ungrazed areas overaged) by about 8%.

The original line-up of erosion points was supplemented by a series of channel profiles, periodic measurements of which will permit of the more positive determination of what happens in terms of soil displacement under the combined effect of the various elements entering into the erosion process. At the time these were installed, the opportunity was offered to make measurements of one of these profiles immediately before and after a short and violent, but typical, thunderstorm, during which approximately 3/4 of an inch of rain fell. Of a cross-sectional area of 36.39 square feet, a total of 1.82 square feet, or 5%, was shifted as the result of displacement of material through erosion during the course of the twenty minute storm. 54% of this material was removed and 46% deposited. This particular profile is located within 250 feet of the divide at the head of the channel, and is exposed to the surficial and channel run-off of an area less than 1½ acres in extent.

At the close of November, a few lots of the 1930 Nebraska western yellow pine cone crop, which had been collected in the seed source experiment during September, where threshed and the seed removed. As mentioned in a previous report, the various cone lots were small and the individual cones were rather sub-normal in development, which can be traced, it is believed, to the very severe drough conditions which prevailed during 1930 in the producing territory. As a general rule, the cones are opening very slowly and not at all satisfactorily, and it is rather interesting to surmise whether the conditions of the growing season are reflected in this quality of the cones, which is rather intimately associated with the moisture factor and its mechanical effect in lifting the scales during the drying-out process.

Since the first of December, Roeser has been more or less continuously engaged in preparing the individual project memoranda for the Regional Investigative Committee which will convene in January. This task has been heavier than usual, since it has been necessary to review the largest number of Forest investigative project reports submitted in any one year. Also, some time was spent in summarizing the data compiled during the year for many of the regional growth and management study plots, which it was desired to incorporate in the pending program and report.

The period December 9 to 14 was spent in attendance at the Regional Supervisors' Meeting in Denver and in the Regional Office. The Supervisors' meeting afforded Roeser an excellent opportunity for contacting all of the Supervisors and their technical assistants, and for discussing and settling a number of items demanding more or less prompt attention. From a research standpoint, principal interest in the meeting was centered largely in discussions of the subjects of insect control (tip and pitch moth on the Nebraska, bud worm on the Shoshone, and bark beetles on the Colorado, Black Hills and in Region 4), erosion, cumulative silvical reports and administrative studies. Supervisor Nelson, in discussing the very beneficial result of tip-moth control by means of the introduction of a natural parasite, Campople frustranae, in the Nebraska plantations, presented the following data:

Jack pine, 2-0 stock, 1921 planting, 3/8 to 1/2 mile east of Campople release plot

Year	Average height (In.)	Average height increase (In.)	Per cent leaders infested
1926	40.4	12.8	96
1927	51.5	11.1	87
1928	67.1	15.6	84
1929	81.6	14.5	30
1930	104.7	23.1	35

Western yellow pine 2-1, 1915 planting adjacent to Campople release plot.

Year	Average height (In.)	Average height Increase (In.)	Per cent leaders infested
1925	37.3	5.3	86
1926	44.6	7.3	92
1927	47.9	3.3	88
1928	54.1	6.2	69
1929	61.7	7.6	33
1930	72.5	10.8	15

On a western yellow pine plot two miles west of the parasite release area, the decrease in infested leaders has been from 97% in 1927, the worst year, to 72% in 1930, indicating that this method of treatment is effective and constitutes the salvation of the sandhills plantations from the ravages of the tip-moth.

Before leaving Denver, preliminary arrangements were made for assembling, compiling and summarizing the growth and yield data which have been obtained to date for Engelmann spruce in the strip survey growth studies of cut-over areas (Me 6). Supervisor Pearce was given this assignment and it is hoped that the work will be completed before the next field season. It is expected that the results will be useful in preparing management plans for the spruce forests of the Region, for which only a small amount of data are available from sample-plot studies. It is probable that they will be presented in print in one form or another when completed.

In summarizing various meteorological phenomena for 1930 for the Fremont Station at the close of the year, attention is directed again to the situation involving the extensive winter-killing of Douglas fir foliage and buds during the 1929-30 winter at the higher elevations around Pikes Peak. This subject was discussed by Supervisor Keithley in a recent Service Bulletin article "Evergreens turn Deciduous." More and more, it is suspected that this destruction took place during January rather than in the spring (as a result of late frosts). For example, following a ten day period of dry freezing weather, preceding January 16, in which the maximum temperatures at 9,000 feet stood in more or less normal relation to those at Colorado Springs (6,000 feet) a very strong Chinook wind at the high elevations forced the thermometer to 40° F, while at the lower station, the maximum temperature recorded was 13°. Within 10 hours, however, an unprecedented decline of 68.8° to -28.8° occurred which was accompanied by a fairly heavy fall of snow. Two days later, a maximum of 35.2 was recorded. In the meantime, and until 5 days later, freezing temperatures, but with much higher minima, prevailed in the foothills. In the face of such extremely severe and rapidly fluctuating conditions of exposure, it is hardly to be expected that species and varieties not strictly indigenous can be expected to survive. The question of seed provenance seems to be rather definitely related to such a problem.

MANUSCRIPTS

Allegheny

Diameter Distribution in White Pine Stands, by A. F. Hatch, (For J.A.R.)

Appalachian

Liberation Cuttings and Cleanings on National Forest Timber Sale Areas, (Address by J. H. Buell before Pisgah Forest Management Meeting, Dec. 10, 1930.)

Lasting Damage to Forest Trees to be Expected from the Drought of 1930, By E. H. Frothingham (For Yearbook).

Intermountain

Erosion on Uncultivated Lands in the Intermountain Region, by C. L. Forsling (For Scientific Monthly).

Northeastern

Forest Fire Research, by P. W. Stickel (For Empire Forester).

Central States

The Central Hardwood Forests - A research Task, by E. F. McCarthy (For Proc. of Central States Forestry Congress).

Protection from Grazing is Essential to the Welfare of the Farmwoods of the Central States, by Ralph K. Day, (For Proc. of Central States Forestry Congress).

What Species Shall we Plant? by L. F. Kellogg (For Proc. of Central States Forestry Congress).

Pacific Northwest

Phenology as an Instrument of Forest Administration, by Ernest L. Kolbe. (Presented before annual meeting of Northwest Science Association at Spokane, Wash., Dec. 1930).

The Effect of Dry Cycles Upon Forests and Some Forest Uses, by Walter H. Meyer. (Presented before annual meeting of Northwest Science Association at Spokane, Wash., Dec. 1930).

IN PRINT

Curry, John R.	Rev.: "Forest Research in Pennsylvania," by J. S. Illick (Jour. For. Jan. 1931)
" " "	Rev.: "Profits from Farm Woods," by W. R. Mattoon, Dept. Pub. 87. (Jour. For., Jan. 1931).
" " "	Rev.: "Cork Oak, A Forest Tree with Possibilities for California," by Woodbridge Metcalf. (Jour. For. Jan. 1931).
Day, R. K.	Destructiveness of Grazing to Farmwoods." (Purdue Agr., Oct. 1930).
Eyre, F. H.	Chopping Christmas Trees. (Amer. Forests and Forest Life, Dec. 1930).
Gemmer, E. W.	American Ingenuity and Reforestation. (Jour. For., Dec. 1930).
" " "	A Word for Exotics. (Jour. For., Jan. 1931).
Gisborne, H. T.	Rev.: "Forest Research in Switzerland," in Annals of Fed. For. Res. Station. (Jour. For. Jan. 1931).
Hansen, T. S.	A New Transplant Board. (Jour. For. Dec. 1930).
Hansen, T. S.	Current Growth in Norway Pine. (Jour. For., Jan. 1931).
Johnson, Kittredge, and Schmitz	Aspen: Availability, Properties and Utilization. Tech. Bul. 70, Univ. of Minn.
Krauch, Hermann	Mortality of Cut-over Stands of Western Yellow Pine. (Jour. For. Dec. 1930).
Meyers, Walter H.	A Method of Constructing Growth Tables for Selectively Cut Stands of Western Yellow Pine. (Jour. For. Dec. 1930).
" " "	A Study of the Relation Between Actual and Normal Yields of Immature Douglas Fir Forests. (J.A.R. Nov. 1, 1930).
Scholz H. F. and S. A. Wilde	The Basis of Subdividing Mountainous Forests for the Purpose of Management. (Jour. For. Dec. 1930).

Shirley, Hardy	Rev. of: "A Thermoelectric Radiometer for Silvical Research." by Paul R. Gast, Harvard Forest Bul. No. 14) (Jour. For. Jan. 1931)."
Westveld, M.	Suggestions for the Management of Spruce Stands in the Northeast. Dept. Cir. 134.

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Annual Investigative Council Meeting to be Held in Spokane, Washington, January 9 and 10, 1931.

Members of the Office were busy during the third week in December preparing project status sheets and memorandums covering the progress and results obtained during the year 1930 in Products work. This year the status sheets only were sent out to the members of the council. The report of each research agency covering progress during 1930 with particular reference to results obtained is to be presented at the meeting in Spokane. Representatives of all the research agencies in the Region plan to attend this annual meeting.

Study Course in Products is Being Prepared.

M. Bradner was busy during the last week in December preparing the first two lessons for the Products Study Course. The first lesson is planned to furnish information on Forest Products research that will be of general use to Forest officers in connection with their regular duties in the Service and in contact with the public. It is hoped that by means of the course the men will obtain a better understanding of the major problems in forest utilization and the need for investigations along such lines as a means of conserving our forests by intelligent use.

The second lesson is based upon the statistical data collected by the office and will give the latest available information for both Idaho and Montana on the present supply of timber, the ownership, the amounts of forest products cut annually, the costs of production and the value of the industry to the State. Mr. Anderson is preparing the third lesson which takes up in detail the Regional logging-milling studies, with particular reference to the need for such studies, the results being obtained and their application to regional problems. Selective logging, what it means, and how it may be used to stimulate the practice of private forestry will also be discussed. Mr. C. N. Whitney is preparing the fourth and final lesson in the course. In the lesson Mr. Whitney plans to give the latest available information on the preservatives in use, the methods of treatment and the cost of treating with particular reference to improvement work on the National Forests.

Logging Output Manuscript Reviewed by Girard and Klobucher.

M. Bradner met Mr. J. Girard and Mr. F. J. Klobucher in Portland on December 9 and together they reviewed the latest manuscript covering the Inland Empire Logging Output Studies. M. Bradner completed the manuscript in November, but due to Mr. Girard's absence in the field an earlier conference could not be arranged. The manuscript is now being

reviewed and commented on by members of Region One's Office of Management and Logging Engineering. The corrected manuscript together with all graphs, tables and pictures will be transmitted to Washington in the very near future for final editing and approval.

Inspection of Western Larch Paving Blocks.

The Higgins Avenue bridge at Missoula was constructed in 1908 - 1909. In the beginning it was paved with cheap Douglas fir blocks of very poor quality, which were replaced with western larch blocks in 1914. The larch blocks were treated by the Western Wood Preserving Company with 16 lbs. of creosote per cubic foot and laid in a sand cushion which varied from 1" to 3" depth.

At the end of seven years this pavement was giving constant trouble through heaves and swelling and the breaking up of blocks along the trolley track. The two main causes of failure in this case were too light a rail which ribrated under traffic, thus shattering the blocks along the track, and the fact that the sand cushion in which they were laid became a moisture reservoir. In making the repairs needed in 1921 the western larch blocks were therefore taken up cleaned, dipped in hot creosote and relaid on approximately 63 per cent of the total surface of the bridge. New rails of heavier steel were put in the trolley tracks. In the space between the rails and for a width of one foot on the outside of each rail the wood blocks were replaced with brick. An inspection of this pavement, made by Whitney on December 8, 1930, shows that there has been very little wear upon the western larch blocks during the past nine years since they were taken up and relaid upon an asphalted concrete surface. None of them have been replaced because of decay and only about one per cent for other causes.

Information from this inspection and other sources has been worked up by Whitney as a proposed article for publication in The Wood Preserving News.

Miscellaneous.

While in Portland, Mr. Bradner spent a few days with Mr. Andrews and members of the Forest Survey organization getting a line on the actual mechanics of the job and the progress of the work. Mr. Bradner also attended a morning meeting of the Western Division of the U. S. Chamber of Commerce and listened in on the report of the lumber industry section of the Chamber. Col. Greeley delivered a very excellent address on the situation in the lumber industry in the Northwest.

Before returning to Missoula Mr. Bradner attended a two-day meeting of the Region's Federal Protection Board at Spokane, Washington. On the second day an open meeting was held to discuss the white pine

blister rust situation in the region. State officers, lumbermen, bankers, railroad officials, and many others, interested in the forest situation in the region were in attendance. Mr. Anderson and Mr. Whitney of the Products Office and Mr. Cool of Drafting had prepared some excellent charts showing the value of white pine to the lumber industry in the Inland Empire.

Mr. Uderitz representing the U.S. Tariff Commission was a visitor in the office during Christmas week. Mr. Uderitz and two assistants have been assigned the Inland Empire for the tariff study. Mr. Uderitz started the survey in Missoula and Mr. Bradner helped him in getting acquainted.

Lumber Prices & Movement

Av. Mill-Run Prices

	Annual, 1929	1st Q., 1930	2nd Q., 1930	3rd Q., 1930	Nov., 1930
Idaho White Pine	$34.33	$35.33	$34.28	$33.72	$30.92
Western Yellow Pine	26.17	24.57	23.29	19.27	19.02
Larch-Fir	20.29	18.35	18.28	16.28	15.62
White Fir	20.94	19.45	18.45	15.65	12.79
Spruce	24.23	23.51	22.76	20.42	21.35

Shipments and Cut	1929	1930
Shipment	111,514	88,395
Cut	151,514	75,890

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OFFICE OF PRODUCTS - REGION 6

Branch of Research

Survey of Sawmill Waste in the Douglas Fir Region - Considering Hodgson's absence during the latter part of December on account of annual leave, very satisfactory progress was made in connection with this study. During the first part of the month he worked, with the assistance of Miss Leonard, on the computations of field data and before leaving he was able to organize the material so that Miss Leonard could carry on with the help of the Marchant Calculating Machine until his return.

Douglas Fir Pulp Tests

At the request of the Madison Laboratory, Johnson shipped about two and one-half cords of Douglas fir sawmill waste, similar to that being used by the Longview Fibre Company, to Madison, Wisconsin. The wood, which was furnished by the Longview Fibre Company of Longview, Washington, came from the Long-Bell Lumber Company's mill and consisted of inside trimmer ends. It is understood that this wood, together with other shipments of Douglas fir logs made in the past are to be used by the Laboratory in connection with its program for studying the possibilities of pulping western woods. It will be recalled that Congress has appropriated $25,000.00 for the use of the Laboratory in conducting these studies.

Minor Timber Products Studies

The bulk of Johnson's time, before he left on annual leave, was given to the preparation of questionnaires and directories to be used in connection with this study. This study, described in detail in the October report, is to be confined to industries producing minor timber products in Oregon and Washington. It will be carried on, more or less, in the form of a census for the purpose of collecting information that will supplement available statistical data with particular regard to the needs of the forest resource survey.

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FOREST TAXATION INQUIRY

North Carolina

The Hollerith tabulations for all of the three sample counties have been received from Washington, and tables prepared from them in form for further study and possible publication. Wager and Thomson have prepared most of the sections of an office report covering the entire North Carolina study.

Studies of special forest tax legislation

Herbert completed the field study of the situation in Vermont, obtaining some interesting data from a rural life study which is being conducted in part from the land utilization standpoint under the direction of Doctor L. C. Taylor. An office report has been prepared covering this state. Hall made a study of the special forest tax law in Maine during November and at the same time, DeVries made an economic study of the land situation in that state in which special

attention was paid to the financing of governmental functions in the wild land territory as opposed to the organized towns. Hall also made brief studies of the operation of the forest tax laws in Iowa, Indiana and Ohio. In all of these states, valuable cooperation was obtained from state forest and tax officials and from the Forest Experiment Stations. Certain studies conducted by questionnaires to various select lists of forest land owners remain to be completed in Massachusetts, Vermont and Indiana.

Progress Reports

Progress Report No. 11, entitled "Tax Delinquency in the Selected Counties of Oregon and Washington" by Daniel Pingree, was distributed to the mailing list. Nos. 10 and 12 are at Washington awaiting publication.

Forest Taxation in Europe

W. E. Hiley of Oxford, England, was in the office during much of December and completed an office report on the taxation of forest lands in Britain. An arrangement was made by which he will spend an additional period of about two months in writing up sections for the final report dealing with the forest tax situation in certain other European countries, so far as this is possible with the materials which have been previously collected by the Inquiry.

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